

Second Sound Measurements Very Near the Lambda Point

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High resolution measurements of the second sound velocity near the superfluid transition in ^4He are reported. Experiments were performed using the resonant technique in cavities approximately 13mm, 4mm and 2mm in height. A disc of paramagnetic salt, copper ammonium bromide, in direct contact with the helium sample and coupled to a SQUID magnetometer, was used as the sensing element in each resonator. The sound was generated by wire-wound heaters embedded in the end opposite the sensor in each cavity. The superfluid density was determined from second sound measurements and the critical exponent ν , predicted by renormalization group theory, was determined. The results for the exponent were found to be very sensitive to the treatment of systematic effects in the data. Measurements approached the lambda transition to within a few nanokelvin of the cut-off temperature set by gravity.

helium

resonance